

AMENDMENTS TO THE SPECIFICATION

Please amend the paragraph beginning on page 3, line 8, as follows:

Generally, when the reddish component increases, the light emission characteristic of light emitting apparatus deteriorates. In color that human eyes feel, electromagnetic radiation with wavelength of 380 nm to 780 nm range causes sensation of brightness. A characteristics of spectral luminous efficacy is given as one of indicator for representing this. The characteristics of spectral luminous efficacy is hill-shaped, and its peak is 550 nm. When electromagnetic radiation of the same condition indent, in the case of a wavelength range near 580 nm to 680 nm as a reddish component, and a wavelength range near 550 nm, human eyes recognize that the electromagnetic radiation of the wavelength range including reddish component causes less sensation. Accordingly, in the red range, high intensity incidence of electromagnetic radiation is required to cause sensation of brightness on human eyes as same as the green or blue range.

Please amend the paragraph beginning on page 3, line 28, as follows:

The inventors of the present invention have diligently studied to achieve the above objects, and as a result developed the present invention. A light emitting apparatus according to claim 1 of the present invention, comprises a light emitting element, and a phosphor which absorbs a part of light emitted from said light emitting element and converts it into light with different wavelength. In this light emitting apparatus, the surface of said phosphor is coated with a coating member made of a material different from the phosphor, and said coating member is made of ~~any of metal oxide, metal nitride or metal oxynitride~~.

Please amend the paragraphs beginning on page 4, line 3 through page 7, line 9, as follows:

In a light emitting apparatus according to another aspect of the present invention of claim 2 according to the light emitting apparatus of claim 1, said coating member coats the surface of said phosphor whereby having a substantially smooth film.

In a light emitting apparatus according to another aspect of the present invention of claim 3 according to the light emitting apparatus of claim 1, said coating member is formed such that a large number of fine particles relatively smaller than said phosphor aggregate to coat the whole surface of said phosphor.

In a light emitting apparatus according to another aspect of the present invention of claim 4 according to the light emitting apparatus of any of claims 1 to 3, said coating member contains at least one metallic element selected from the group consisting of Al, Si, and In, Ga and the other rare earth elements. For example, the coating member may be formed of a composite material with Al, Si, and so on.

In a light emitting apparatus according to another aspect of the present invention of claim 5 according to the light emitting apparatus of any of claims 1 to 4, the phosphor before coating has hydration characteristics.

In a light emitting apparatus according to another aspect of the present invention of claim 6 according to the light emitting apparatus of any of claims 1 to 5, said phosphor is an alkaline-earth silicon nitride phosphor.

In a light emitting apparatus according to another aspect of the present invention of claim 7 according to the light emitting apparatus of any of claims 1 to 5, said phosphor is an alkaline-earth silicon oxynitride phosphor.

In a light emitting apparatus according to another aspect of the present invention of claim 8 according to the light emitting apparatus of any of claims 1 to 8, the BET value of said coated phosphor is 1.0 to 10 times the BET value before coating.

In a light emitting apparatus according to another aspect of the present invention of claim 9 according to the light emitting apparatus of any of claims 1 to 13, the

average thickness of said coating is 10 nm to 500 nm.

In a light emitting apparatus according to another aspect of the present invention of claim 10 according to the light emitting apparatus of any of claims 1 to 13, said coating is formed in chemical vapor deposition.

A phosphor for a light emitting element according to another aspect of the present invention of claim 11 absorbs a part of light emitted from the light emitting element and converts it into light with different wavelength. In this phosphor for a light emitting element, the surface of said phosphor is coated with a coating member made of a material different from the phosphor, and said coating member is made of metal nitride or metal oxynitride.

In a phosphor for a light emitting element of claim 12 according to another aspect of the present invention the phosphor for a light emitting element of claim 11, said coating member coats the surface of said phosphor whereby having a substantially smooth film.

In a phosphor for a light emitting element according to another aspect of the present invention of claim 13 according to the phosphor for a light emitting element of claim 11, said coating member is formed such that a large number of fine particles relatively smaller than the phosphor aggregate to coat the whole surface of said phosphor.

In a phosphor for a light emitting element according to another aspect of the present invention of claim 14 according to the phosphor for a light emitting element of any of claims 11 to 13, said coating member contains at least one metallic element selected from the group consisting of Al, Si, and In, Ga and the other rare earth elements.

In a phosphor for a light emitting element according to another aspect of the present invention of claim 15 according to the phosphor for a light emitting element of any of claims 11 to 14, the phosphor before coating has hydration characteristics.

In a phosphor for a light emitting element according to another aspect of the present invention of claim 16 according to the phosphor for a light emitting element of

~~any of claims 11 to 15, said phosphor is an alkaline-earth silicon nitride phosphor.~~

~~In a phosphor for a light emitting element according to another aspect of the present invention of claim 17 according to the phosphor for a light emitting element of any of claims 11 to 16, said phosphor is an alkaline-earth silicon oxynitride phosphor.~~

~~In a phosphor for a light emitting element according to another aspect of the present invention of claim 18 according to the phosphor for a light emitting element of any of claims 11 to 17, the BET value of said coated phosphor is 1.0 to 10 times the BET value before coating.~~

~~In a phosphor for a light emitting element according to another aspect of the present invention of claim 19 according to the phosphor for a light emitting element of any of claims 11 to 18, the average thickness of said coating is 10 nm to 500 nm.~~

~~In a phosphor for a light emitting element according to another aspect of the present invention of claim 20 according to the phosphor for a light emitting element of any of claims 11 to 19, said phosphor is charged to a negative surface potential before coating.~~

~~In a phosphor for a light emitting element according to another aspect of the present invention of claim 21 according to the phosphor for a light emitting element of any of claims 11 to 20, said coating is formed in chemical vapor deposition.~~

A method ~~according to another aspect of the present invention of claim 23~~ is a method for producing a phosphor for a light emitting element which absorbs a part of light emitted from the light emitting element and converts it into light with different wavelength. This method comprises steps of adsorbing a reaction precursor onto the surface of the phosphor, and coating the surface of the phosphor with a metal nitride by reacting said reaction precursor with a coreaction material in chemical vapor deposition.

~~In a method for a phosphor for a light emitting element of claim 24 according to another aspect of the present invention the method for a phosphor for a light emitting element of claim 22 or 23, said reaction precursor is an organic metal.~~

~~In a method for a phosphor for a light emitting element according to another aspect of the present invention of claim 25 according to the method for a phosphor for a~~

~~light emitting element of claim 24~~, said organic metal contains at least one metallic element selected from the group consisting of Al, Si, and In, Ga and ~~the other~~ rare earth elements.

In a method for a phosphor for a light emitting element according to another aspect of the present invention of claim 26 according to the method for a phosphor for a light emitting element of any of claims 22 to 25, said coreaction material is any of oxygen, water vapor and ammonia.

In a method for a phosphor for a light emitting element according to another aspect of the present invention of claim 27 according to the method for a phosphor for a light emitting element of any of claims 22 to 26, the method further comprises a step of thermally treating the phosphor for a light emitting element after coating in a non-oxidation atmosphere. In this case, it is possible to further improve smoothness of the surface condition after coating.

In a method for a phosphor for a light emitting element according to another aspect of the present invention of claim 28 according to the method for a phosphor for a light emitting element of claim 27, the temperature range of said thermal treatment is 150°C to 1000°C, and the time is 3 to 10 hours.

Please amend the paragraph beginning on page 7, line 26, as follows:

It is preferable that thermal treatment is performed in a non-oxidation atmosphere at relatively low temperature of 150°C to 1000°C for relatively long time of 3 to 10 hours. This allows for a by-product to volatilize without damaging the phosphor, and allows for the surface of the coated phosphor to be close to that of before coating, and thus reduces damage of phosphor itself. Accordingly, it is possible to obtain the phosphor with effective coating.

Please amend the paragraphs beginning on page 7, line 32 through page 9, line 20, as follows:

To achieve the above objects, a nitride group phosphor according to another aspect of the present invention of claim 29 converts at least a part of light with first emission spectrum into light with at least one second emission spectrum in the range different from said first emission spectrum, and comprises a nitride group phosphor material containing N (where N is nitrogen), and a coating material which is made of any of metal oxide, metal nitride and metal oxynitride and coats ~~coating~~ said nitride group phosphor material such that the BET value of the coated phosphor is 1.0 to 10 times the BET value before coating. coating,

and a coating material coating said nitride group phosphor material.

In a nitride group phosphor according to another aspect of the present invention of claim 30, said coating material is a metal nitride group material, or a metal oxynitride group material. This construction provides a nitride group phosphor with thermal resistance capable of emitting light in a range from yellow to red.

In a nitride group phosphor according to another aspect of the present invention of claim 31, said coating material forms a micro capsule. This construction provides a nitride group phosphor with thermal resistance capable of emitting light in a range from yellow to red.

In a nitride group phosphor according to another aspect of the present invention of claim 32, said coating material has a multi-layer structure formed of a plurality of different materials.

In a nitride group phosphor according to another aspect of the present invention of claim 33, said coating material of the multi-layer structure has a high refractive index on said phosphor side, and a low refractive index on the surface side.

In a nitride group phosphor according to another aspect of the present invention of claim 34, said phosphor is a nitride group phosphor represented by L-M-N:R or L-M-O-N:R

(where L contains at least one element selected from the group consisting of Be, Mg, Ca, Sr, Ba, and Zn; M contains at least one element selected from the group consisting of C, Si, Ge, Sn, Ti, Zr, and Hf; N is nitrogen; O is oxygen; and R is a rare earth element).

In a nitride group phosphor according to another aspect of the present invention of claim 35, said phosphor is represented by $L_xM_yN_{\{(2/3)x+(4/3)y\}}:R$, or $L_xM_yO_zN_{\{(2/3)x+(4/3)y-(2/3)z\}}:R$ (where L contains at least one element selected from the group consisting of Be, Mg, Ca, Sr, Ba, and Zn; M contains at least one element selected from the group consisting of C, Si, Ge, Sn, Ti, Zr, and Hf; N is nitrogen; O is oxygen, and R is a rare earth element); and has a crystal structure.

In a nitride group phosphor according to another aspect of the present invention of claim 36, said phosphor is represented by $L_xM_yN_{\{(2/3)x+(4/3)y\}}:R$, or $L_xM_yO_zN_{\{(2/3)x+(4/3)y-(2/3)z\}}:R$ (where $0.5 \leq x \leq 3$, $1.5 \leq y \leq 8$, $0 \leq z \leq 3$; L contains at least one element selected from the group consisting of Be, Mg, Ca, Sr, Ba, and Zn; M contains at least one element selected from the group consisting of C, Si, Ge, Sn, Ti, Zr, and Hf; N is nitrogen; O is oxygen; and R is a rare earth element), and has a crystal structure.

In a nitride group phosphor according to another aspect of the present invention of claim 37, said phosphor is represented by $L_xM_yN_{\{(2/3)x+(4/3)y\}}:R$, or $L_xM_yO_zN_{\{(2/3)x+(4/3)y-(2/3)z\}}:R$ (where $x = 2$, $4.5 \leq y \leq 6.0$, $0.01 < z < 1.5$; $x = 1$, $6.5 \leq y \leq 7.5$, $0.01 < z < 1.5$; or $x = 1$, $1.5 \leq y \leq 2.5$, $1.5 \leq z \leq 2.5$; L contains at least one element selected from the group consisting of Be, Mg, Ca, Sr, Ba, and Zn; M contains at least one element selected from the group consisting of C, Si, Ge, Sn, Ti, Zr, and Hf; N is nitrogen; O is oxygen; and R is a rare earth element), and has a crystal structure.

In a nitride group phosphor according to another aspect of the present invention of claim 38, said phosphor is represented by $Ca_2Si_5O_{0.1}N_{7.9}:Eu$, $Sr_2Si_5O_{0.1}N_{7.9}:Eu$, $(Sr_{0.5}Ca_{0.5})_2Sr_5O_{0.1}N_{7.9}:Eu$, $SrSi_2O_2N_2:Eu$, or $CaSi_2O_2N_2:Eu$, and has a crystal structure.

In a nitride group phosphor according to another aspect of the present invention of claim 39, the crystal structure of said phosphor is a monoclinic system or orthorhombic system.

In a nitride group phosphor according to another aspect of the present invention of

~~claim 40~~, said phosphor contains a B element. A B element serves to increase the particle size of phosphor. Accordingly, this construction can improve the luminance of the phosphor of the present invention.

A light emitting apparatus according to another aspect of the present invention ~~of claim 41~~ comprises a phosphor member composed of a transparent material containing a nitride group phosphor according to another aspect of the invention ~~any of claims 1 to 12~~, and a light emitting element, wherein said phosphor member absorbs a part of light emitted from said light emitting element and emits light with different wavelength.

Please amend the paragraph beginning on page 13, line 27, as follows:

In the semiconductor light emitting apparatus according to the first embodiment shown in Fig. 1, a semiconductor light emitting element 2 is mounted in a central recessed portion of a package 1, and the electrodes of the light emitting element 2 and terminals of the package 1 are connected with ~~wires 3~~ wires 4. A predetermined amount of binder in which the phosphor is dispersed is put in the recessed portion of the package 1, thus ~~a phosphor layer 4~~ thus a phosphor layer 3 is formed. A part of light emitted from the semiconductor light emitting element 2 penetrates the phosphor layer 3. Other part is converted into light with longer wavelength by the ~~phosphor layer 4~~ phosphor layer 3. Accordingly, the combination of the penetrating light and the converted light provide light radiated by the semiconductor light emitting apparatus. Adjustment of the ~~phosphor layer 4~~ phosphor layer 3 provides semiconductor light emitting apparatus with various types of chromaticity, such as white.

Please amend the paragraph beginning on page 19, line 12, as follows:

The nitride group phosphor discussed above absorbs a part of blue light emitted from the light emitting element, and emits light in the range from yellow to red. This phosphor is used for the light emitting apparatus of the aforementioned construction, thus, it is possible to provide a light emitting apparatus which radiates warm, white light by mixing colors of blue

light emitted from the light emitting element and red light of the phosphor. Particularly, in a white light emitting apparatus, the apparatus preferably includes a nitride group phosphor, and an yttrium aluminum oxide phosphor material activated by cerium which is a rare-earth aluminate phosphor. The reason is that, when the apparatus includes the above yttrium aluminum oxide phosphor material, it is possible to adjust desired chromaticity. The yttrium aluminum oxide phosphor material activated by cerium can absorb a part of blue light emitted from the light emitting element, and emit light in the yellow range. In this case, bluish white light can be radiated by mixing the color of blue group light emitted from the light emitting element, and the color of light of the yttrium aluminum oxide phosphor material. Accordingly, the phosphor, which has the transparent member mixed with the yttrium aluminum oxide phosphor material and the aforementioned phosphor together, blue light emitted by the light emitting element are combined, thus, it is possible to provide a warm, white light emitting apparatus. In this warm, white light emitting apparatus, the general color rendering index Ra can be 75 to 95, and the color temperature can be 2000 K to 8000 K. Especially, it is preferable that a white light emitting apparatus, which has a high general color rendering index Ra, and the color temperature of which is located on the blackbody line in the chromaticity diagram. In order to provide a light emitting apparatus with desired color temperature and general color rendering index, the amounts of combination of the yttrium aluminum oxide phosphor material and the phosphor, or the composition ratio of phosphors can be changed if necessary. Particularly this warm white light emitting apparatus is aimed at improving the special color rendering index R9. In a conventional light emitting apparatus which is composed of the combination of a blue light emitting element and an yttrium aluminum oxide phosphor material activated with cerium and emits white light, the special color rendering index R9 is low, and the reddish component is insufficient. Accordingly, there was a problem to be solved that the special color rendering index R9 was improved. On the other hand, in the present invention, the phosphor is included in the yttrium aluminum oxide phosphor material activated by cerium, thus, the special color rendering index R9 can be increased to the range 40 to 70.

Please amend the paragraph beginning on page 20, line 19, as follows:

The average particle size of phosphor is 3 μm or more, preferably 5 μm to 15 μm , and more preferably 10 μm to 12 μm . Very small phosphor is classified and removed by means, such as classification, such that particles with particle size of 2 μm or less occupy not more than 10% in volume distribution. Accordingly, light emission luminance can be improved. Additionally, chromaticity variation depending on the orientation of light is reduced by reducing the number of particles with a particle size of 2 μm or less.

Please amend the paragraph beginning on page 21, line 17, as follows:

Sr and Ca are nitrided at 600°C to 900°C in a nitrogen atmosphere for about 5 hours. As for Sr and Ca, they may be mixed and nitrided, or they may be nitrided separately. Thus, nitrides of Sr and Ca can be obtained. The nitrides of Sr and Ca preferably have a high purity, but commercially available nitrides can also be used.

Please amend the paragraph beginning on page 21, line 26, as follows:

Silicon Si is also nitrided at 800°C to 1200°C in a nitrogen atmosphere for about 5 hours. Thus, a silicon nitride can be obtained. The silicon nitride used for the present invention preferably has a high purity, but commercially available silicon nitride can also be used.

Please amend the paragraph beginning on page 22, line 21, as follows:

Although the burning can be performed at burning temperature of a range 1200°C to 1700°C, the burning temperature is preferably in a range 1400°C to 1700°C.

Please amend the paragraph beginning on page 23, line 15, as follows:

According to the first invention of the present invention, coating the phosphor with a coating member can improve thermal resistance, weather resistance and light resistance, and in addition can reduce adverse effects on each light emitting element in the light emitting apparatus due to the phosphor. Coating refers to forming a substance different from the phosphor on the surfaces of the particles in the phosphor to coat the surfaces of the particles. Although there is difference in the extent of the effect by coating depending on phosphors, particularly, the effect for the nitride phosphor is remarkable. A metal oxide or metal nitride is preferable as a material for coating. Particularly, in a phosphor with coating uniformly formed on the whole surface of the phosphor, coating exerts the effect. It is preferable that coating is uniformly applied to the surface of the phosphor. The coating may be a thin film or aggregation of very small particles with particle size of 1 nm to 10 nm as long as it is uniform. Although various processes for obtaining uniform coating can be used, uniform coating for phosphor can be easily obtained by using chemical vapor-phase reaction among them.

Please amend the paragraph beginning on page 26, line 31, as follows:

Although the nitride group phosphor material obtained by the producing method mentioned above could improve the efficiency and durability of excitation by near-ultraviolet to blue light as compared with a conventional phosphor which emits red light, its luminescence efficiency sharply reduced in high temperature, particularly from about 200°C to 300°C. As the reason that the luminescence efficiency of the nitride group phosphor material sharply reduces in the high temperature, it is conceivable that nitrogen in the nitride group phosphor material decomposes. These coating materials containing an N element can reduce such decomposition of nitrogen in the nitride group phosphor material by providing nitrogen. Although such an effect can be obtained as long as the coating material coats at least a part of nitride group phosphor particle, particularly, it is preferable that it is formed as a

microcapsule which coats the whole particle.

Please amend the paragraph beginning on page 30, line 33, as follows:

The temperature in thermal treatment needs to be sufficient high to volatilize the by-product in the coating but to be low to a certain extent such that the phosphor is not damaged. The temperature in thermal treatment is preferably 150°C to 500°C, is more preferably 200°C to 400°C, and is most preferably 350°C. As the temperature in thermal treatment is relatively low, volatilization efficiency of by-product is also low. But, the treatment is performed in a mild condition for long time, for example 3 to 10 hours, thus, it is possible to volatilize the by-product with minimizing damage to the phosphor.

Please amend the paragraph beginning on page 36, line 28, as follows:

In Fig. 5, a vessel made of a stainless steel alloy, 50 g of silicon nitride phosphor ($\text{Sr}_2\text{Si}_5\text{N}_8:\text{Eu}$), trimethyl aluminum (TMA), and oxygen were used as the reaction vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. TMA was stored in the bubbler 410 held at 27°C in the thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided for dilution of TMA, and joined the pipe for TMA immediately in front of the introduction tube 43. ~~Water vapor was introduced into the bubbler in the thermostat held at 25°C by nitrogen bubbling.~~ While the temperature of the heater 45 was held at 50 to 250°C, TMA/ N_2 , N_2 , and O_2 were continuously flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for 6 hours.

Please amend the paragraph beginning on page 37, line 26, as follows:

In Fig. 5, a vessel made of a stainless steel alloy, 25 g of silicon nitride phosphor ($(\text{Sr}, \text{Ca})_2\text{Si}_5\text{N}_8:\text{Eu}$), trimethyl aluminum (TMA), and oxygen were used as the reaction

vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. TMA was stored in a bubbler 110 held at 27°C in a thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided for dilution of TMA, and joined the pipe for TMA immediately in front of the introduction tube 43. ~~Water vapor was introduced into the bubbler in the thermostat held at 25°C by nitrogen bubbling.~~ While the temperature of the heater 45 was held at 50°C, TMA/N₂, N₂, and O₂ were continuously flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for 3 hours.

Please amend the paragraph beginning on page 38, line 19, as follows:

In Fig. 5, a vessel made of a stainless steel alloy, 20 g of oxynitride phosphor (Ca₂Si₅N₈:Eu), TMA, and oxygen were used as the reaction vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. TMA was stored in the bubbler 110 held at 25°C in the thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided for dilution of TMA, and joined the pipe for TMA immediately in front of the introduction tube 43. While the temperature of the heater 45 was held at 50°C to 250°C, TMA/N₂, N₂, and O₂ were continuously flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for 1.5 hours.

Please amend the paragraph beginning on page 38, line 33, as follows:

In Fig. 5, a vessel made of a stainless steel alloy, 30 g of oxynitride phosphor (BaSi₂O₂N₂:Eu), TMA, and oxygen were used as the reaction vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. TMA was stored in the bubbler 110 held at 25°C in the thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided

for dilution of TMA, and joined the pipe for TMA immediately in front of the introduction tube 43. While the temperature of the heater 45 was held at 50°C to 250°C, TMA/N₂, N₂, and O₂ were continuously flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for 4 hours.

Please amend the paragraph beginning on page 39, line 14, as follows:

In Fig. 5, a vessel made of a stainless steel alloy, 50 g of BAM phosphor (BaMg₂Al₁₆O₂₇:Eu), TMA, and oxygen were used as the reaction vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. TMA was stored in the bubbler 110 held at 25°C in the thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided for dilution of TMA, and joined the pipe for TMA immediately in front of the introduction tube 43. While the temperature of the heater 45 was held at 50°C to 250°C, TMA/N₂, N₂, and O₂ were continuously flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for 8 hours.

Please amend the paragraph beginning on page 39, line 28, as follows:

In Fig. 5, a vessel made of a stainless steel alloy, 50 g of BAM phosphor (BaMg₂Al₁₆O₂₇:Eu), TMA, and oxygen were used as the reaction vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. TMA was stored in the bubbler 110 held at 25°C in the thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided for dilution of TMA, and joined the pipe for TMA immediately in front of the introduction tube 43. While the temperature of the heater 45 was held at 50°C to 250°C, TMA/N₂, N₂, and O₂ were continuously flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for 30 hours.

Please amend the paragraph beginning on page 40, line 9, as follows:

In Fig. 5, a vessel made of a stainless steel alloy, 100 g of afterglow phosphor ($\text{SrAl}_4\text{O}_7:\text{Eu, Dy}$), TMA, and oxygen were used as the reaction vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. TMA was stored in the bubbler 110 held at 25°C in the thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided for dilution of TMA, and joined the pipe for TMA immediately in front of the introduction tube 43. While the temperature of the heater 45 was held at 50°C to 250°C, TMA/ N_2 , N_2 , and O_2 were continuously flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for 12 hours.

Please amend the paragraph beginning on page 40, line 25, as follows:

An example in which a gadolinium oxide was coated on the phosphor is described, as an example 10. In Fig. 5, a vessel made of a stainless steel alloy, 50 g of silicon nitride phosphor ($(\text{Sr}_x\text{Ca}_{1-x})_2\text{Si}_5\text{N}_8:\text{Eu}$, $0 \leq x \leq 1.0$), $\text{Gd}(\text{DPM})_3$ (gadolinium tris-dipivaloylmethanate), and oxygen were used as the reaction vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. $\text{Gd}(\text{DPM})_3$ was stored in the bubbler 110 held at 50°C to 150°C in the thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided for dilution of $\text{Gd}(\text{DPM})_3$, and joined the pipe for TMA immediately in front of the introduction tube 43. While the temperature of the heater 45 was held at 50°C to 250°C, $\text{Gd}(\text{DPM})_3/\text{N}_2$, N_2 , and O_2 were flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for a predetermined period. Thus, a gadolinium oxide was coated on the phosphor.

Please amend the paragraph beginning on page 41, line 6, as follows:

An example in which an yttrium oxide was coated on the phosphor is described, as an example 11. In Fig. 5, a vessel made of a stainless steel alloy, 50 g of silicon nitride phosphor ($(\text{Sr}_x\text{Ca}_{1-x})_2\text{Si}_5\text{N}_8:\text{Eu}$, $0 \leq x \leq 1.0$), $\text{Y}(\text{DPM})_3$ (yttrium tris-dipivaloylmethanate), and oxygen were used as the reaction vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. $\text{Y}(\text{DPM})_3$ was stored in the bubbler 110 held at 50°C to 150°C in the thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided for dilution of $\text{Y}(\text{DPM})_3$, and joined the pipe for $\text{Y}(\text{DPM})_3$ immediately in front of the introduction tube 43. While the temperature of the heater 45 was held at 50°C to 250°C , $\text{Y}(\text{DPM})_3/\text{N}_2$, N_2 , and O_2 were flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for a predetermined period. Thus, an yttrium oxide was coated on the phosphor.

Please amend the paragraph beginning on page 41, line 20, as follows:

Moreover, an example in which an aluminium nitride or aluminum oxynitride was coated on the phosphor is described, as an example 12. In Fig. 5, a vessel made of a stainless steel alloy, 50 g of silicon nitride phosphor ($(\text{Sr}_x\text{Ca}_{1-x})_2\text{Si}_5\text{N}_8:\text{Eu}$, $0 \leq x \leq 1.0$), TMA, and ammonia were used as the reaction vessel 41, the phosphor 42, the reaction precursor, and the coreaction material, respectively. TMA was stored in the bubbler 110 held at 25°C in the thermostat 49, and was introduced into the introduction tube 43 by nitrogen bubbling. In addition, the pipe 411 for nitrogen was separately provided for dilution of TMA, and joined the pipe for TMA immediately in front of the introduction tube 43. While the temperature of the heater 45 was held at 50°C to 250°C , TMA/N_2 , N_2 , and NH_3 were flowed at flow rates 0.1 L/min, 0.25 L/min, and 0.25 L/min, respectively, for reaction for a predetermined period. Thus, an aluminum nitride or aluminum oxynitride was coated on the phosphor.